

NOISE ASSESSMENT

Land South of Saltmarsh Lane, Hayling
Island, PO11 0JT

for

Hayling Island Builders Ltd

A21079

April 2021

V2.0



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1.0 Context

- 1.1 It is proposed to develop land south of Saltmarsh Lane, Hayling Island, to provide 60 new homes
- 1.2 Patrick Parsons in combination with Noise Solutions has been commissioned by Hayling Island Builders Ltd to undertake a noise impact assessment to determine the suitability of the development proposals for residential use at the site known as Land South of Saltmarsh Lane, Hayling Island, PO11 0JT
- 1.3 This report presents the results of the environmental noise survey, the applicable policy/ guidance and the noise impact assessment demonstrating the suitability of the site for residential development.
- 1.4 To assist with the understanding of this report a brief glossary of acoustic terms can be found in **Appendix A**. A more in-depth glossary of acoustic terms can be assessed at the following web address <http://www.acoustic-glossary.co.uk/>

2.0 Site Description

- 2.1 The development site is located to the south of Saltmarsh Lane, Hayling Island. West Lane lies to the east and Glebe Close to the south east. The Hayling Billy Trail lies to the west. The southern edge of the site is bounded by a drainage channel.
- 2.2 It is proposed to develop the site for residential use. 60 new homes will be provided.
- 2.3 **Appendix B** contains an aerial photograph showing the site and surrounding area.

3.0 Policy Context

Noise Policy Statement for England

- 3.1 The Noise Policy Statement for England (NPSE), published in March 2010, sets out the long-term vision of Government noise policy. The Noise Policy aims, as presented in this document, are: *“Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*
- avoid significant adverse effects on health and quality of life;
 - mitigate and minimise adverse effects on health and quality of life; and
 - where possible, contribute to the improvement of health and quality of life.”
- 3.2 The NPSE makes reference to the concepts of NOEL (No Observed Effect Level) and LOAEL (Lowest Observed Adverse Effect Level) as used in toxicology but applied to noise impacts. It also introduces the concept of SOAEL (Significant Observed Adverse Effect Level) which is described as the level above which significant adverse effects on health and quality of life occur.
- 3.3 The first aim of the NPSE is to avoid significant adverse effects, taking into account the guiding principles of sustainable development (as referenced in Section 1.8 of the NPSE). The second aim seeks to provide guidance on the situation that exists when the potential noise impact falls between the LOAEL and the SOAEL, in which case: *“...all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development.”*
- 3.4 Importantly, the NPSE goes on to state that: *“This does not mean that such adverse effects cannot occur.”*
- 3.5 The NPSE does not provide a noise-based measure to define SOAEL, acknowledging that the SOAEL is likely to vary depending on the noise source, the receptor and the time in question. NPSE advises that: *“Not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.”*
- 3.6 It is therefore likely that other guidance will need to be referenced when applying objective standards for the assessment of noise, particularly in reference to the SOAEL, whilst also taking into account the specific circumstances of a proposed development.

National Planning Policy Framework

- 3.7 A new edition of NPPF was published in February 2019 and came into effect immediately. The original National Planning Policy Framework (NPPF) was published in March 2012, with a revision in July 2018 - this document replaced the existing Planning Policy Guidance Note 24 (PPG 24) “Planning and Noise.” The 2019 revised edition contains no new directions or guidance with respect to noise, and hence, all previous references remain extant. The paragraph references quoted below relate to the February 2019 edition.
- 3.8 Paragraph 170 of the NPPF states that the planning system should contribute to and enhance the natural and local environment by, (amongst others) *“preventing both new and existing*

development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, water or noise pollution or land stability.”

- 3.9 The NPPF goes on to state in Paragraph 180: “planning policies and decisions should ...
- Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development, - and avoid noise giving rise to significant adverse impacts on health and quality of life;
 - identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason...
- 3.10 The NPPF document does not refer to any other documents or British Standards regarding noise other than the Noise Policy Statement for England (NPSE).
- 3.11 Paragraph 2 of the NPPF states that *“planning law requires that applications for planning permission must be determined in accordance with the development plan unless material considerations indicate otherwise.”*
- 3.12 Paragraph 12 of the NPPF states that *“The presumption in favour of sustainable development does not change the statutory status of the development plan as the starting point for decision making. Where a planning application conflicts with an up-to-date development plan (including any neighbourhood plans that form part of the development plan), permission should not usually be granted. Local planning authorities may take decisions that depart from an up-to-date development plan, but only if material considerations in a particular case indicate that the plan should not be followed”*.
- 3.13 Paragraph 117 states that “Planning policies and decisions should promote an effective use of land in meeting the need for homes and other uses, while safeguarding and improving the environment and ensuring safe and healthy living conditions. Strategic policies should set out a clear strategy for accommodating objectively assessed needs, in a way that makes as much use as possible of previously-developed or ‘brownfield’ land”.

Planning Practice Guidance – Noise

- 3.14 An updated Planning Practice Guidance (PPG) for noise was published on 22 July 2019 and provides additional guidance and elaboration on the NPPF. It advises that when plan-making and decision-taking, the Local Planning Authority should consider the acoustic environment in relation to:
- Whether or not a significant adverse effect is occurring or likely to occur;
 - Whether or not an adverse effect is occurring or likely to occur; and
 - Whether or not a good standard of amenity can be achieved.
- 3.15 This guidance introduced the concepts of NOAEL (No Observed Adverse Effect Level), and UAEL (Unacceptable Adverse Effect Level). NOAEL differs from NOEL in that it represents a situation where the acoustic character of an area can be slightly affected (but not such that there is a perceived change in the quality of life). UAEL represents a situation where noise is ‘very disruptive’ and should be ‘prevented’ (as opposed to SOAEL, which represents a situation where noise is ‘disruptive’, and should be ‘avoided’).

- 3.16 As exposure increases above the LOAEL, the noise begins to have an adverse effect and consideration needs to be given to mitigating and minimising those effects, taking account of the economic and social benefits being derived from the activity causing the noise. As the noise exposure increases, it will then at some point cross the SOAEL boundary.
- 3.17 The LOAEL is described in PPG as the level above which *“noise starts to cause small changes in behaviour and attitude, for example, having to turn up the volume on the television or needing to speak more loudly to be heard”*.
- 3.18 PPG identifies the SOAEL as the level above which *“noise causes a material change in behaviour such as keeping windows closed for most of the time or avoiding certain activities during periods when the noise is present.”*
- 3.19 In line with the Explanatory Note of the NPSE, the PPG goes on to reference the LOAEL and SOAEL in relation to noise impact. It also provides examples of outcomes that could be expected for a given perception level of noise, plus actions that may be required to bring about a desired outcome. However, in line with the NPSE, no objective noise levels are provided for LOAEL or SOAEL although the PPG acknowledges that *“...the subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation.”*
- 3.20 The relevant guidance in the PPG in relation to the adverse effect levels is summarized below:

Response	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not Present	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not Intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and Intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum

Significant Observed Adverse Effect Level			
Present and Disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very Disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

3.21 The Planning Practice Guidance states the following in relation to mitigation measures:

“For noise sensitive developments, mitigation measures can include avoiding noisy locations in the first place; designing the development to reduce the impact of noise from adjoining activities or the local environment; incorporating noise barriers; and optimising the sound insulation provided by the building envelope.”

3.22 In addition, the Guide notes that it may also be relevant to consider:

“... whether any adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time (and the effect this may have on living conditions). In both cases a suitable alternative means of ventilation is likely to be necessary. Further information on ventilation can be found in the Building Regulations”.

Local Authority

3.23 Havant Borough Council’s Draft Local Plan 2036 was published for consultation in January 2018.

3.24 Policy E6 High Quality Design states:

Planning permission will be granted for development that:

....

C. Demonstrates that it:

...

Vi. Avoids over-dominance and not cause unacceptable harm to the amenity of neighbours through overshadowing, massing, the loss of privacy, outlook, overlooking, and through odour, noise or disturbance

3.25 Policy E20 Amenity and pollution states:

Development proposals will be permitted where:

- a. Projected levels of air, noise, odour, vibration, light, water or other pollution do not have an actual or likely significant negative effect on the amenity of existing and future users of the site, nearby occupiers and residents or the wider environment; and*
- b. Where any significant negative effects are identified, applicants will be required to provide appropriate mitigation measures which can be demonstrated to be suitable for the purposes intended, and will ensure that any likely or actual negative effect on receptor(s) identified by criteria a. are limited to an acceptable level.*

4.0 Acoustic Standards and Guidance

Institute of Acoustic Professional Practice Guidance

- 4.1 The Institute of Acoustics published a guidance document for new residential development in May 2017, in conjunction with the ANC and the Chartered Institute of Environmental Health, “to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England”.
- 4.2 The document advocates a two-stage process for consideration of noise affecting new residential developments. Stage 1 is an initial risk assessment of the proposed development site, based on the ambient noise levels in the area. Stage 2 recommends consideration of four main elements:
- demonstration of a “good acoustic design process”
 - observation of internal noise guidelines
 - an assessment of noise affecting external amenity areas
 - consideration of other relevant issues
- 4.3 The initial risk assessment considers the indicative day-time and night-time equivalent continuous noise levels which indicates an “increasing risk of adverse effect” with increasing noise levels.
- 4.4 For Stage 2, the ProPG document recommends that the guidance in BS 8233:2014 is followed.

BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings.

- 4.5 This Standard provides recommended guideline values for internal noise levels within dwellings which are similar in scope to guideline values contained within the World Health Organisation (WHO) document, Guidelines for Community Noise (1999). These guideline noise levels are shown in 2, below:

Table 2 BS 8233:2014 Desirable Internal Ambient Noise Levels for Dwellings

Activity	Location	07:00 to 23:00 hours	23:00 to 07:00 hours
Resting	Living room	35 dB $L_{Aeq,16h}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16h}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16h}$	30 dB $L_{Aeq,8h}$

- 4.6 BS 8233:2014 advises that: “regular individual noise events...can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$ depending on the character and number of events per night. Sporadic noise events could require separate values.”
- 4.7 BS8233 also gives general guidance on the expected sound insulation performance of a given building façade, with details of how various elements can affect the overall performance. Concerning windows, it states that:
- “If partially open windows were relied upon for background ventilation, the insulation would be reduced to approximately 15dB.”*

4.8 This implies that should windows on a noise affected façade be openable, a sound insulation value of 15dB should be applied to the whole façade to an internal room being assessed. It should be noted that a sound insulation performance of much greater than 15dB is expected for non-openable standard double glazed windows. However in order to assess the worst case scenario, this report assume that windows may be opened if desired.

4.9 The standard also provides advice in relation to design criteria for external noise. It states that:

“for traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable.

In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55 dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space.”

Building Regulations

4.10 Part L of the Building Regulations mandates that buildings become more airtight, and Part F stipulates ventilation requirements. Even though there appears to be a contradiction in this, Part L limits uncontrollable ventilation, while Part F ensures that ventilation requirements are provided in a controlled manner.

Ventilation requirements for dwellings

Background ventilation

4.11 Three types of ventilation are required under Part F. Whole building ventilation provides nominally continuous air exchange which may be reduced or ceased when the building is not occupied. It can be provided via background ventilators operating alone, or together with:

- passive stack ventilators;
- continuous mechanical extract; or
- continuous mechanical supply and extract with heat recovery.

- 4.12 Extract ventilation is applicable to rooms where most water vapour and/or pollutants are released (e.g. kitchens and bathrooms). It can be provided by intermittent fans, passive stack or continuous mechanical extract with or without mechanical supply and heat recovery.
- 4.13 The four systems described in Part F do not present solutions which utilise the use of opening windows for background ventilation. Opening windows do not provide a controllable means of ventilation and also pose security risks.

Purge ventilation

- 4.14 Purge ventilation is required throughout the building to aid the removal of high concentrations of pollutants and water vapour. It is commonly provided simply by opening windows and doors.
- 4.15 Even though purge ventilation is recommended via opening windows, the temporary and intermittent occurrence of this does not normally result in an unacceptable increase of internal noise levels.
- 4.16 Part F goes on to say that “Purge ventilation provisions may also be used to improve thermal comfort, although this is not controlled under the Building Regulations.”

Summary in relation to ventilation

- 4.17 In summary, Part F recommends that background ventilation for new residential dwellings should be provided via one of the four systems in Approved Document F. The composite external building fabric should be designed to ensure that appropriate internal noise levels due to external incident noise are met during background ventilation.
- 4.18 Purge ventilation for new residential dwellings should be provided via open windows. The slight increase of internal noise levels should be considered acceptable.

5.0 Assessment Methodology

Environmental Noise Survey

- 5.1 An unattended environmental sound pressure level survey was undertaken from Wednesday 31st March to Thursday 1st April 2021. The survey was undertaken in order to establish the typical highest incident environmental noise levels at the proposed residential development.
- 5.2 Full details of the surveys are provided in [Appendix C](#) alongside time history graphs of the measurement results.
- 5.3 The relevant results of the survey have been summarised in Table 3 and Table 4.

Table 3 Summary of survey results

Measurement location	Measurement period	Range of recorded sound pressure levels (dB)			
		L _A F _{max} (15mins)	L _A eq(15mins)	L _A 10(15mins)	L _A 90(15mins)
Saltmarsh Lane	Daytime (07.00 – 23.00 hours)	50 - 84	37 - 60	40 - 61	31 - 44
	Night-time (23.00 – 07.00 hours)	37 - 77	31 - 56	33 - 59	27 - 41
Glebe Close	Daytime (07.00 – 23.00 hours)	61 - 79	38 - 62	38 - 65	31 - 47
	Night-time (23.00 – 07.00 hours)	37 - 77	31 - 62	33 - 68	26 - 41

- 5.4 The incident environmental noise levels at the facades of the proposed apartments are summarised below.

Table 4 Summary of free field environmental noise levels

Period	Parameter	Sound pressure level, dB	
		Saltmarsh Lane	Glebe Close
31 st March 2021 daytime*	L _A eq,T	51	52
31 Mar – 1 Apr night-time	L _A eq,8hours	46	52
1 st April 2021 daytime*	L _A eq,T	53	55
Overall daytime	L_Aeq, 16 hours	52	54
Overall night-time	L_Aeq, 8 hours	46	52

**not complete 16 hour measurements.*

- 5.5 Measured octave band sound pressure levels corresponding to the overall values above are given in Table 5.

Table 5 Measured octave band sound pressure levels at the measurement locations

Position	Period	Incident sound pressure levels (dB) at Octave Band Centre Frequencies (Hz)								dBA
		63	125	250	500	1000	2000	4000	8000	
Saltmarsh Lane	Daytime L_{eq} , 16 hours	57	51	48	46	46	43	46	40	52
	Night-time L_{eq} , 8 hours	49	40	38	36	38	39	40	38	46
Glebe Close	Daytime L_{eq} , 16 hours	57	53	50	50	49	44	47	44	54
	Night-time L_{eq} , 8 hours	49	41	39	37	39	37	50	41	52

Covid-19

- 5.6 The environmental noise survey was undertaken in March-April 2021, at a time when the coronavirus pandemic was causing a disruption to working patterns and other activity, but at the time of the survey a partial lifting of restrictions was in place. It is therefore likely that during the time of the survey traffic flows during the survey were lower than they would normally be.
- 5.7 The potentially reduced traffic flows may lead to a reduction in the ambient sound level ($L_{Aeq,T}$) due to road traffic. Government estimates indicate that during weekdays in the period covered, Great Britain-wide private vehicle use was approximately 80% of normal use, with light goods vehicles and heavy goods vehicles at approximately pre-Covid normal levels. A reduction of 20% in car numbers would suggest a reduction in noise level of around 1dB(A) from cars alone, on heavily-used roads where the flow of vehicles is continuous, for example close to motorways and other major trunk routes. The reduction in the overall traffic noise level, however, would be lower where there is a high proportion of goods vehicles.
- 5.8 On less heavily used roads, where traffic is less constant, the reduction in noise level experienced is likely to be lower than the values outlined above. The measurements made during the environmental survey are therefore considered to be similar to those pre-Covid.

6.0 Residential Noise Assessment

Incident sound levels used in assessment

- 6.1 As a worst-case, measurements made on Glebe Close have been considered representative of incident noise levels at the proposed new dwellings.

Initial Risk Assessment

- 6.2 At worst, the daytime incident noise levels are up to 54dB LAeq,16hr during the daytime and up to 52 dB LAeq,8hr at night. Daytime noise levels are therefore within the “low” range of noise levels in Figure 1 of the IoA ProPG document, while night-time noise levels are just within the “medium” range.
- 6.3 The ProPG document notes that:

At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.

As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development.

Building fabric assessment

- 6.4 In order to assess the suitability of the site for the proposed dwellings it is important to predict the internal noise levels within habitable rooms.
- 6.5 The composite acoustic performance required of any portion of the building envelope will depend on its location relative to the principal noise sources around the site and the nature of the spaces behind it (noise criteria, size, room finishes etc.).
- 6.6 The variation in incident noise levels on the different façades, along with differences in internal layouts and size of glazed areas, implies that a number of different sound insulation performance levels may be required in order for a specific internal ambient noise level to be reached. Logistically, this could result in increased costs for the development due to bespoke solutions, effects on programme and increase of errors during construction.
- 6.7 Therefore, it is not practical to specify a large number of different external building fabric constructions and this is also not supported by national policy on noise.
- 6.8 The detailed calculation methodology described in BS 8233:2014 has been used in the assessment. Table 6 below presents the input data used to predict the resultant internal noise level in the habitable rooms. Since final house layouts are to be advised typical data has been used, though it should be noted that the information used is considered to be pessimistic and therefore the resulting assessment errs on the side of caution.

Table 5 Measured octave band sound pressure levels at the measurement locations

Dining / living room	
Room Volume (m ³)	80
Room Type	Dining/living room
Room Furnishings	Suite, part-carpeted floor, curtains
Area of window (m ²)	6
Area of external wall (m ²)	11
Bedroom	
Room Volume (m ³)	31
Room Type	Bedroom
Room Furnishings	Bed, carpet, curtains
Area of window (m ²)	5
Area of external wall (m ²)	7

6.9 Based on the information above, and the noise spectrum data shown in Table 5, the resulting internal sound levels may be calculated. The results of the assessment are shown in Table 7. These predictions are based on the following typical glazing and ventilator constructions:

- Standard (e.g. 4/16/4 thermal double glazing) to all habitable rooms;
- Standard non-acoustic trickle ventilators to all habitable rooms;
- Traditional brick-block cavity walls with slate/tile roof and plasterboard ceiling under roof joists.

6.10 The minimum airborne sound insulation performance of each of these constructions is as set out in Table 8.

Table 7 Predicted internal sound pressure levels (closed windows)

Room type	Period/ Parameter	External sound level, dB	Internal sound level, dB	Criterion, dB	Excess, dB
Kitchen-living room	Daytime L _{Aeq} 16hr	54	23	35	-12
Bedrooms	Daytime L _{Aeq} 16hr	54	26	35	-9
	Night-time L _{Aeq} 8hr	52	15	30	-15

Table 1 Proposed building envelope specifications

Item		Attenuation (dB) at Octave Band Centre Frequency (Hz)							
		63	125	250	500	1000	2000	4000	8000
Type A Glazing [typically 4mm glass /16mm cavity /4 mm glass]	SRI	21	24	20	25	34	37	40	40
Standard trickle ventilator	D _{ne}	30	32	32	31	33	31	31	31
Non-vision wall – all areas Cavity brick-block construction (or cladding with dry-lining with similar acoustic performance)	SRI	35	41	45	45	54	58	55	55

- 6.11 It should be noted that glazing configurations and other constructions described above are for guidance and costings purposes only. It will be the responsibility of the manufacturer to provide evidence of compliance with the required octave band sound reduction performances.
- 6.12 The assessment shows that with typical building constructions and glazing and ventilators, internal noise levels will be significantly below the guidance values in BS 8233:2014.

Mitigation of overheating

- 6.13 It is important to note that the building envelope sound insulation specifications and associated advice given in this report are based on meeting the design criteria under the “Whole Dwelling Ventilation” conditions set out in Approved Document F (and formerly referred to as “background ventilation” in previous editions of the AD), as distinct from “Extract Ventilation” or “Purge Ventilation” conditions within the AD, and from the overheating condition (which is only briefly mentioned in AD F).
- 6.14 In January 2020 the Association of Noise Consultants (ANC) and Institute of Acoustics (IoA) published a Residential Design Guide on Acoustic Ventilation and Overheating (“the AVO Guide”), which sets out some of the acoustic design issues associated with the control of overheating. A brief narrative on the contents and relevant detail of the AVO Guide is given in Appendix E.
- 6.15 The following points should be noted, however:
- the resulting internal noise levels in the control-of-overheating condition depend not only on the technical solution used but on the duration that the control is used and the time of day (since the external noise levels vary throughout the day).
 - the internal noise levels set out in Table 3-3 of the AVO Guide have been developed by the members of the AVO Guide working party and represent their opinion on the sound levels that would be acceptable; Local Authorities are not obliged to accept those values and – to our knowledge – they have not yet been tested legally (i.e. by a planning appeal or similar).

- 6.16 The AVO guide suggests that a value of 13dB(A) is used for the noise reduction provided by an open window. Resulting internal noise levels would therefore be as shown in Table 9.

Table 9 Predicted internal sound pressure levels (open windows)

Room type	Period/ Parameter	External sound level, dB	Internal sound level, dB	AVO proposed criterion, dB	Excess, dB
Kitchen-living room	Daytime L _{Aeq} 16hr	54	41	50	-9
Bedrooms	Daytime L _{Aeq} 16hr	54	41	50	-9
	Night-time L _{Aeq} 8hr	52	39	42	-3

- 6.17 Internal noise levels with windows open would therefore be within the values recommended in the AVO guide and should therefore be acceptable. It should be noted that these are worst-case values assuming that windows are open continuously to control overheating. Where windows are only open for a proportion of the time the internal noise levels will be lower

External noise levels

- 6.18 At worst, noise levels in gardens exposed to roads are likely to be around 54 dB LAeq 16hour and therefore below the upper guidance value for amenity spaces set out in BS 8233:2014 (55dB LAeq 16 hour). Where the garden is screened from roads, for example by the building orientation and/or boundary fencing, noise levels will be 5 to 10dB lower and therefore below the recommended guidance value in BS 8233:2014 (50dB LAeq 16 hour).

Conclusion

- 6.19 The assessment has demonstrated that, taking into consideration the provision of reasonable practicable measures (i.e. the provision of good quality thermal double glazing and non-acoustic trickle ventilators) adverse effects of noise can be minimised for the development proposals.

7.0 Discussion of Results and Uncertainties

7.1 Where possible uncertainty in the above assessments has been minimised by taking the following steps:

- The measurements of the environmental sound levels were taken over a 24-hour period.
- The meters and calibrators used have a traceable laboratory calibration and the meter was field calibrated before and after the measurements.
- Uncertainty in the calculated impacts has been reduced by the use of well-established calculation methods

8.0 Summary

- 8.1 Patrick Parsons in combination with Noise Solutions has been commissioned by Hayling Island Builders Ltd to review the acoustic suitability of the proposed new houses to be built on land to the south of Saltmarsh Lane, Hayling Island.
- 8.2 An environmental noise survey at the proposed site was undertaken in order to establish the typical highest incident road traffic noise levels at the proposed residential development.
- 8.3 The assessment has demonstrated that the proposals will not give rise to significant adverse effects on health and quality of life and that reasonable practicable mitigation measures can be put in place using conventional construction methods in order for adverse effects to be reduced.
- 8.4 Therefore, the assessment has demonstrated that incident ambient noise levels around the proposed residential development should not be viewed as a constraint for the planning application.

Appendix A Acoustic Terminology

Parameter	Description
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ($L_{Aeq,T}$).
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s_1 and s_2 is given by $20 \log_{10} (s_1/s_2)$. The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is $20\mu\text{Pa}$. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.
dB(A), L_{Ax}	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
Fast Time Weighting	Setting on sound level meter, denoted by a subscript F, that determines the speed at which the instrument responds to changes in the amplitude of any measured signal. The fast time weighting can lead to higher values than the slow time weighting when rapidly changing signals are measured. The average time constant for the fast response setting is 0.125 (1/8) seconds.
Free-field	Sound pressure level measured outside, far away from reflecting surfaces (except the ground), usually taken to mean at least 3.5 metres
Façade	Sound pressure level measured at a distance of 1 metre in front of a large sound reflecting object such as a building façade.
$L_{Aeq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level recorded during a noise event with a period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise. $L_{A10,18h}$ is the A-weighted arithmetic average of the 18 hourly $L_{A10,1h}$ values from 06:00-24:00.
$L_{90,T}$	A noise level index. The noise level that is exceeded for 90% of the measurement time interval, T. It gives an indication of the lower levels of fluctuating noise. It is often used to describe the background noise level and can be considered to be the "average minimum" noise level and is a term used to describe the level to which non-specific noise falls during quiet spells, when there is lull in passing traffic for example.

Appendix B

Aerial photograph of site showing approximate location of sound level meters



Appendix C Environmental sound survey

Details of environmental sound survey

- C.1 Measurements of the existing sound pressure levels at the site were undertaken from 14:00 hours on Wednesday 31st March to 16:00 hours on Thursday 1st April 2021.
- C.2 The sound level meters were programmed to record the A-weighted Leq, L90, L10 and Lmax noise indices for consecutive 15-minute sample periods for the duration of the survey. Measurement positions

Measurement Position

- C.3 The sound level meters were positioned on lamp-posts on Dances Way and Glebe Close, as indicated in **Appendix B**.
- C.4 In accordance with BS 7445-2:1991 'Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use', the measurements were undertaken under free-field conditions.

Equipment

- C.5 Details of the equipment used during the survey are provided in the table below. The sound level meter was calibrated before and after the survey; no significant change (+/-0.2 dB) in the calibration level was noted.

Position	Description	Model / serial no.	Calibration date	Calibration certificate no.
Saltmarsh Lane	Class 1 Sound level meter	Svantek 977/ 69747	20/08/2020	14015672
	Condenser microphone	ACO Pacific 7052E / 70829		
	Preamplifier	Svantek SV12L / 73687		
	Calibrator	Svantek SV 40A / 10843	20/08/2020	14015672-3
Glebe Close	Class 1 Sound level meter	Svantek 977/ 7446	12/02/2021	Factory conformity certificate
	Condenser microphone	Microtech MK255 / 20194		
	Preamplifier	Svantek SV12L / 106487		
	Calibrator	Svantek SV 30A / 10847	15/07/2020	TCRT20/1381

Weather Conditions

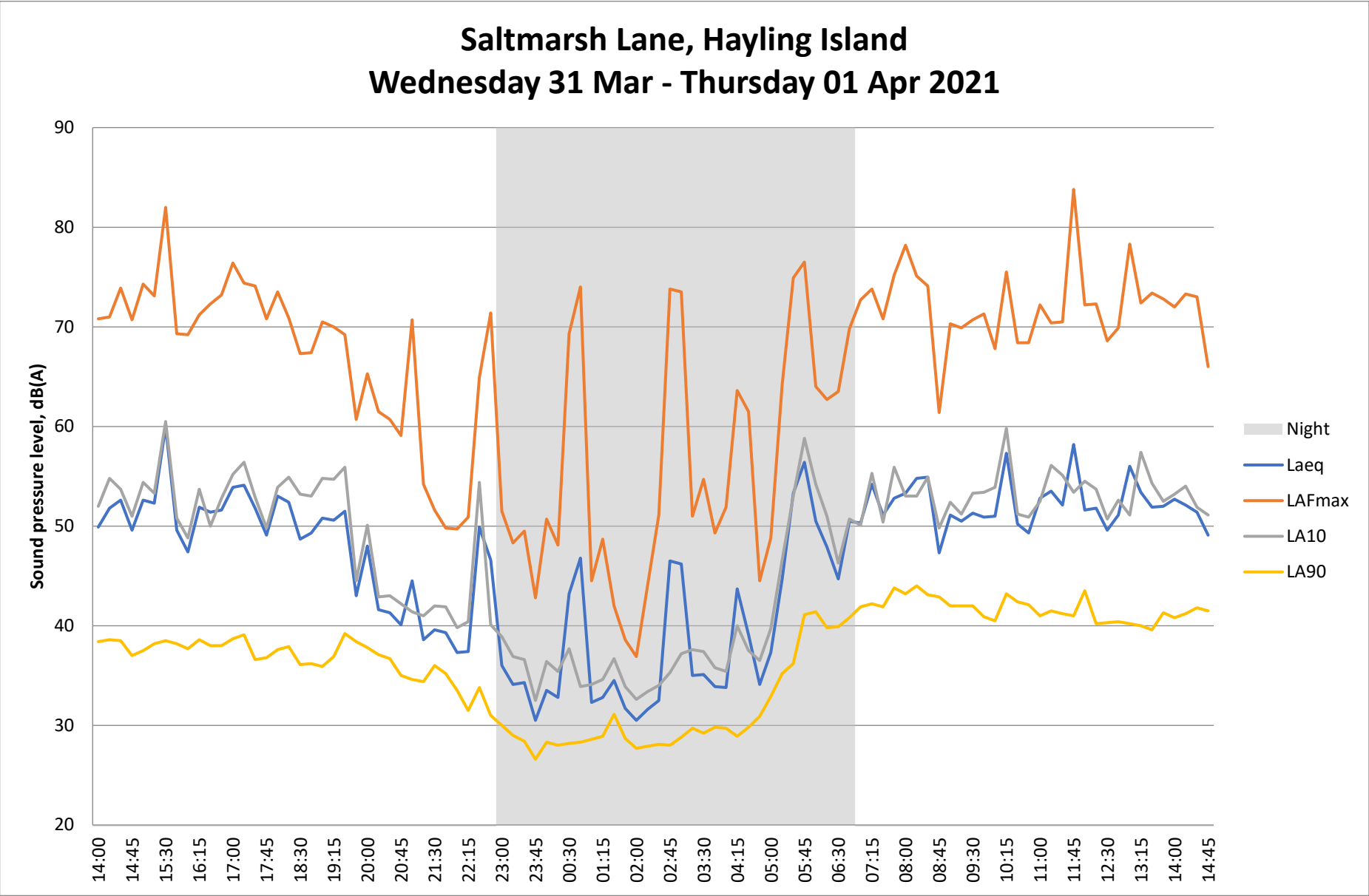
- C.6 Weather conditions were determined both at the start and on completion of the survey. It is considered that the meteorological conditions were appropriate for environmental noise measurements. The table below presents the weather conditions recorded on site at the beginning and end of the survey.

Weather Conditions				
Measurement Location	Date/Time	Description	Beginning of Survey	End of Survey
As indicated on Appendix B	14.45 31 Mar – 16.00 1 Apr 2021	Temperature (°C)	15	16
Cloud Cover Symbol Scale in oktas (eighths) 0 Sky completely clear 1 2 3 4 Sky half cloudy 5 6 7 8 Sky completely cloudy (9) Sky obstructed from view		Precipitation:	None	None
		Cloud cover (oktas - see guide)	8	8
		Presence of fog/snow/ice	No	No
		Presence of damp roads/wet ground	Dry	Dry
		Wind Speed (m/s)	Still	2
		Wind Direction	-	SW
		Conditions that may cause temperature inversion (i.e. calm nights with no cloud)	No	No

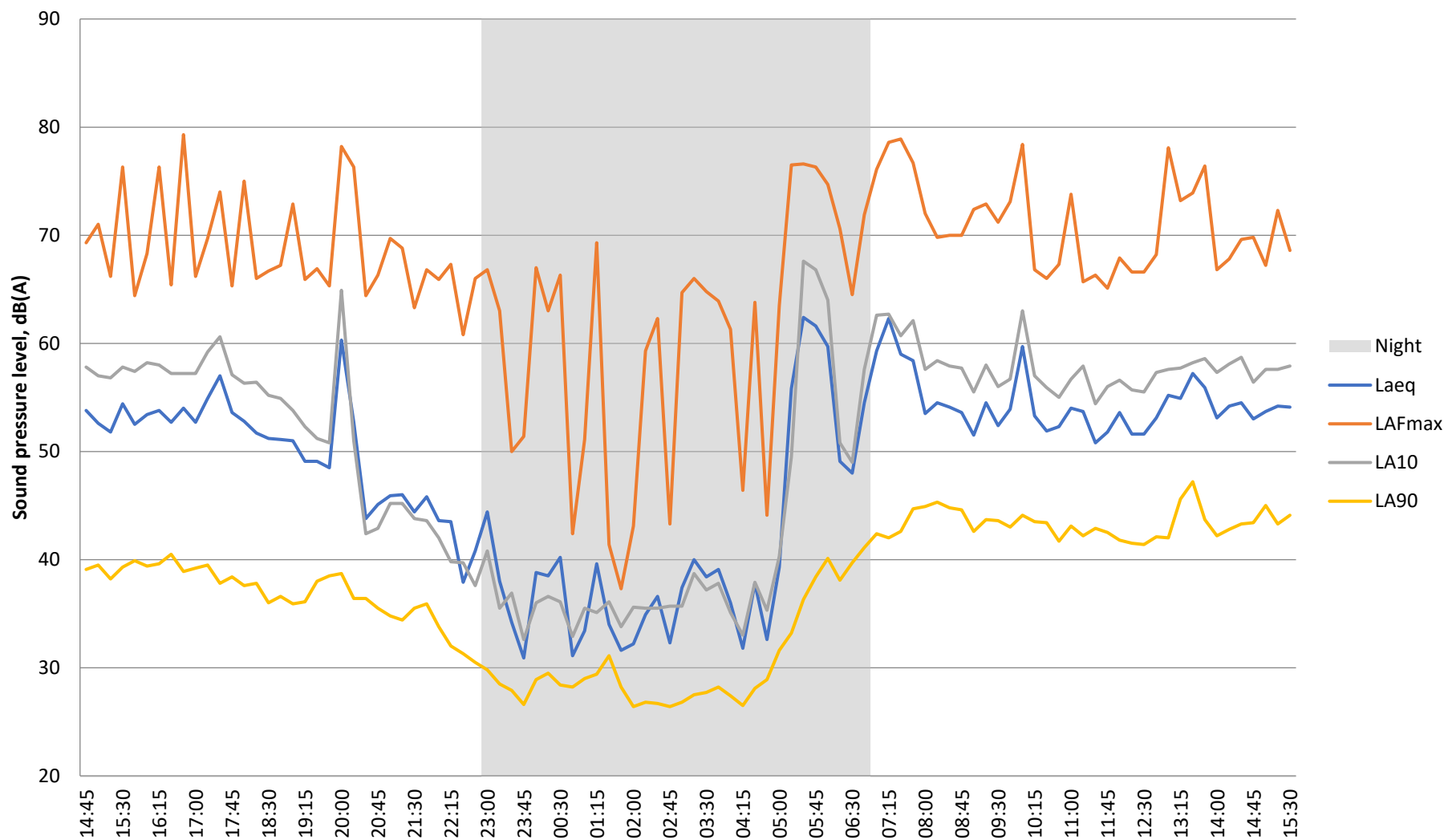
Results

- C.7 The results of the survey are representative of the typical incident noise levels at the proposed residential blocks. The noise levels around the development were observed to be due to a combination of light local traffic, more distant traffic and birdsong and other natural sounds. The results of the survey are presented in two time history graphs overleaf.

Saltmarsh Lane, Hayling Island
Wednesday 31 Mar - Thursday 01 Apr 2021



Glebe Close, Hayling Island Wednesday 31 Mar - Thursday 01 Apr 2021



Appendix D Narrative on AVO Guide

- D.1 The Residential Design Guide on Acoustics Ventilation and Overheating (version 1.1) (“the AVO Guide”) was published in January 2020 by the Association of Noise Consultants (ANC) and the Institute of Acoustics (IoA).
- D.2 The AVO Guide states that it “is intended to be used by acoustics practitioners as well as all those involved in the planning, development, design and commissioning of new dwellings. It recommends an approach to acoustic assessments for new residential development that take due regard of the interdependence of provisions for acoustics, ventilation, and overheating”.
- D.3 It seeks to “assist in educating clients, environmental health/planning officers and other stakeholders of the interdependence of design for acoustics, ventilation and overheating” and recognises that:
- To enable designers and planners to make fully informed decisions, however, requires two further pieces of information. The first is to know how long windows will need to be open, which may be determined from a dynamic thermal model, or more qualitatively from the GHA Overheating Risk Tool. The second requires a better understanding of the potential adverse impact of combined exposure to noise and overheating. Crucially, how long will people tolerate higher noise levels in order to stay cool? One suggestion is to consider the overall average day (16h) and night (8h) time average noise levels.*
- D.4 It notes that there “... is a need to address how ... the strategy for mitigating overheating impacts on the acoustic conditions, and whether a more detailed overheating assessment is required to inform this”.
- D.5 Section 2 of the AVO Guide sets out the relevant legislation and guidance and notes that “it is important to differentiate between the need to provide ‘purge ventilation’ as required occasionally under ADF (i.e. to remove smoke from burnt food etc.); against the provision of ventilation to help control overheating, which is not covered by The Building Regulations”.
- D.6 On the subject of overheating it states:

2.7 *There are no specific requirements relating to overheating in The Building Regulations. Both ADF and Approved Document L1A of The Building Regulations briefly mention overheating but do not provide details on what constitutes overheating*

2.13 *Developments will normally (but not always) require additional ventilation (above ADF whole dwelling ventilation provisions) in order to mitigate overheating. Where an overheating assessment is undertaken, it should provide details as to the duration and rate of any additional ventilation required to meet overheating compliance criteria. Where this additional ventilation is provided passively, the overheating assessment should also provide information about the required size of façade openings*

2.16 *An overheating assessment might not always be undertaken for a project and without this information it is difficult to identify noise impacts that may occur during the overheating condition.*

- D.7 With regard to acoustic criteria it notes that “where a development is considered necessary or desirable, the levels in [BS 8233:2014, Table 4] may be relaxed by up to 5dB and reasonable internal conditions still achieved.” It should be noted that this approach is not accepted by most local authorities, who require the guidance in BS 8233:2014 to be met.
- D.8 Section 3 sets out guidance for internal ambient noise levels and recommends that a two-stage process is followed. The Level 1 assessment assumes that opening windows is the primary means of mitigating overheating, while a Level 2 assessment “considers the potential for adverse effect on occupants based on internal ambient noise level”.
- D.9 The AVO Guide notes:

3.9 *It is suggested here that the desirable internal noise standards within Table 4 of BS 8233:2014 should be achieved when providing adequate ventilation as defined by ADF whole dwelling ventilation. However, it is considered reasonable to allow higher levels of internal ambient noise from transport sources when higher rates of ventilation are required in relation to the overheating condition.*

- D.10 Table 3-3 in the AVO Guide, reproduced below, identifies the suggested highest permissible internal noise levels in the overheating condition:

Table 3-3 Guidance for Level 2 assessment of noise from transport noise sources^[Note 1] relating to overheating condition

Internal ambient noise level ^[Note 2]			Examples of Outcomes ^[Note 3]	
$L_{Aeq,T}$ ^[Note 4] during 07:00 – 23:00 ^[Note 4]	$L_{Aeq,T}$ during 23:00 – 07:00	Individual noise events during 23:00 – 07:00 ^[Note 4]		
> 50 dB	> 42 dB	Normally exceeds 65 dB $L_{Aeq,10s}$	Noise causes a material change in behaviour e.g. having to keep windows closed most of the time	Avoiding certain activities during periods of intrusion. Having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.
			Increasing likelihood of impact on reliable speech communication during the day or sleep disturbance at night	At higher noise levels, more significant behavioural change is expected and may only be considered suitable if occurring for limited periods. As noise levels increase, small behavioural changes are expected e.g. turning up the volume on the television; speaking a little more loudly; having to close windows for certain activities, for example ones which require a high level of concentration. Potential for some reported sleep disturbance. Affects the acoustic environment inside the dwelling such that there is a perceived change in quality of life. At lower noise levels, limited behavioural change is expected unless conditions are prevalent for most of the time. ^[Note 4]
≤ 35 dB	≤ 30 dB	Do not normally exceed $L_{Aeq,10s}$ 45 dB more than 10 times a night	Noise can be heard, but does not cause any change in behaviour	Noise can be heard, but does not cause any change in behaviour, attitude, or other physiological response ^[Note 4] . Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.

Note 1 The noise levels suggested in Tables 3-2 and 3-3 assume a steady road traffic noise source but may be adapted for other types of transport.

D.11 The explanatory notes include:

3.15 For the daytime period, the upper category in Table 3-3 is defined on the basis that LAeq,T 50 dB represents the upper end of the range for reliable speech communication.

3.16 For the night-time period, the upper category in Table 3-3 is defined with reference to the WHO Night Noise guidelines, which state that for external levels above LAeq,T 55 dB: “adverse health effects occur frequently and a sizeable proportion of the population is highly annoyed and sleep-disturbed”.

3.18 In the case of the overheating condition, the effect of increased internal ambient noise from external noise sources will depend both on the absolute noise level and the amount of time for which the overheating condition occurs. A good design process should therefore, as a priority, seek to minimise heat gains thereby reducing the amount and duration of ventilation required to control overheating and the consequential effect from increased ingress of noise.

D.12 Paragraph 3.26 notes that “The Level 2 assessment suggests that assessment of the adverse effect from noise exposure should include an estimate of how frequently and for what duration the overheating condition occurs.”.

D.13 Appendix B in the AVO Guide sets out an example application of the guide, and includes examples of passive ventilation solutions and the attenuation each provides. This is set out in Table B-5, reproduced overleaf. It should be noted that in the majority of cases there is a wide range of potential performance values and the actual performance achieved will be depend on the precise design used.

Table B-5 Examples of passive ventilation solutions providing enhanced sound insulation

Design option	Description and references	Approximate Level Difference (external free field level – internal reverberant level)	Improvement relative to a window providing a similar amount of ventilation
Standard opening windows	Window(s) open sufficiently to provide a ventilation free-area equivalent to 2% of the floor area. ^[42]	13 dB	0 dB
Open windows with sound attenuating balconies	Window(s) as above. Balconies may have a solid balustrade or be enclosed to a further degree (maintaining an open area for ventilation). Absorption may be provided to the balcony soffit or potentially to other surfaces. ^[49, 50, 51]	17 – 23 dB	4 – 10 dB
Attenuated or plenum windows	Dual windows (spaced by around 200mm) with staggered openings and absorptive linings to the cavity reveals. Various other configurations also possible in principle. ^[52, 53]	17 – 24 dB	4 – 11 dB
Attenuated vents/louvres	Ventilation openings with integral means of attenuating sound. Typically this may be acoustic louvres or acoustically lined ducts/plena. ^[54, 55]	17 – 29 dB	4 – 16 dB
Attenuated windows or vents/louvres with sound attenuating balconies	Combined use of balconies to provide screening and acoustically attenuated windows or vents. Refer to above for description of each element.	21 – 39 dB	8 – 26 dB

UK locations:

London

Huddersfield

Birmingham

Guildford

International locations:

Dubai



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